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AGREEMENT

CONCERNING THE ADOPTION OF UNIFORM CONDITIONS OF APPROVAL AND RECIPROCAL RECOGNITION OF APPROVAL FOR MOTOR VEHICLE EQUIPMENT AND PARTS

done at Geneva on 20 March 1958

Addendum 21: Regulation No. 22

Revision 3 - Amendment 1

Incorporating

04 series of amendments - Date of entry into force: 20 March 1995
Corrections to 04 series of amendments referred to in the depositary notification C.N.215.1995.TREATIES-44 of 7 August 1995

UNIFORM PROVISIONS CONCERNING THE APPROVAL OF PROTECTIVE HELMETS AND THEIR VISORS FOR DRIVERS AND PASSENGERS OF MOTOR CYCLES AND MOPEDS

UNITED NATIONS

Paragraph 3.1.1.2., amend to read:

"3.1.1.2. A brief technical specification stating the materials used and a test report of the photometric and colorimetric performances of the retroreflective material."

Paragraph 3.1.1.4., amend to read:

"3.1.1.4. A number of helmets, with or without visors, out of 20 samples of different sizes, sufficient to enable all the tests specified in paragraph 7.1. to be conducted and one helmet additionally to be retained by the technical service responsible for conducting the approval test."

Paragraph 5.1.4.1.1., footnote 3/, amend to read:

"3/ 1 for ...., 22 for the Russian Federation, 23 for Greece, 24 (vacant), 25 for Croatia, 26 for Slovenia, 27 for Slovakia, 28 for Belarus and 29 for Estonia. Subsequent numbers ..."

Paragraphs 6.11. to 6.11.4., replace by the following text:

"6.11. The helmet shall be held in place on the wearer's head by means of a retention system which is secured under the lower jaw. All parts of the retention system shall be permanently attached to the system or to the helmet.

6.11.1. If the retention system includes a chin-strap, the strap shall be not less than 20 mm wide under a load of 150 N ± 5 N applied under the condition prescribed in paragraph 7.6.2.

6.11.2. The chin strap shall not include a chin-cup.

6.11.3. Chin straps shall be fitted with a device to adjust and maintain tension in the strap.

6.11.4. Chin strap fastening and tensioning devices shall be positioned on the straps either so that there are no rigid parts extending more than 130 mm vertically below the headform reference plane with the helmet mounted on the appropriate sized headform, or so that the whole of the device is between the bony projections of the underside of the lower jaw.

6.11.5. If the retention system includes either a double-D ring or sliding bar fastening device then means shall be provided to prevent the retention system being completely undone and also to retain the free end of the strap when the retention system is adjusted.

6.11.6. Sliding bar and double-D ring fastening devices shall be fitted with a pulling flap to be used for releasing the retention system. Its colour must be red and its minimum dimensions must be 10 x 20 mm.

6.11.7. If a retention system includes a quick-release mechanism, then the method of release of this mechanism shall be self-evident. Any levers, tabs, buttons or other components which need to be operated to release the mechanism shall be coloured red, those parts of the rest of the system which are visible when closed shall not be similarly coloured, and the mode of operation shall be permanently indicated.

6.11.8. The retention system shall remain closed when the tests described in paragraphs 7.3., 7.6. and 7.7. are carried out. When a helmet type includes a range of sizes, the helmet subject to the test shall be that presenting the least favourable conditions (such as thickest padding, etc.).

6.11.9. The buckle of the retention system shall be designed so as to preclude any possibility of incorrect manipulation. This means, inter alia, that it must not be possible for the buckle to be left in a partially closed position."

Insert new paragraphs 6.16. to 6.16.6., to read:

"6.16. Conspicuity marking

6.16.1. General

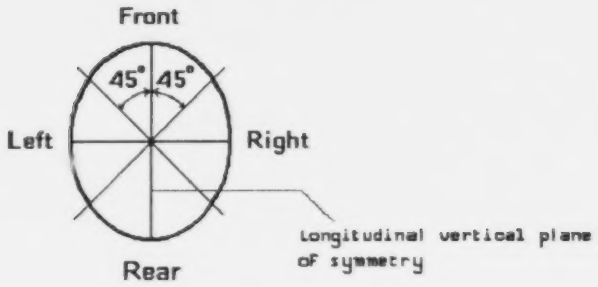
In order to comply with national requirements for use, the helmet may be required by individual Contracting Parties to contribute to the conspicuity of the user both during the daytime and at night:
from the front;
from the rear;
from the right;
from the left
by means of parts made of reflective materials which conform to the specifications laid down in paragraphs 6.16.2. to 6.16.6. of this Regulation.
The reflective parts shall not be removable without damage to the helmet.

Note: The mandating of conspicuity marks is left to the discretion of individual Contracting Parties. Article 3 of the Agreement to which this Regulation is annexed shall not prevent the Contracting Parties from prohibiting the use of helmets not meeting the conspicuity requirements.

6.16.2. Reflective parts

6.16.2.1. Geometry

The total surface area and shape of the reflective part used shall be such that in each direction, corresponding to one of the areas defined in the figure below, visibility is ensured by a surface area of at least 18 cm^2 of simple shape and measured by application on a plane.



In each surface area of minimum 18 cm^2 it shall be possible to mark:
either a circle of 40 mm diameter;
or, a rectangle at least 12.5 cm^2 in surface area and at least 20 mm in width.

Each of these surfaces shall be situated as near as possible to the point of contact with the shell of a vertical plane parallel to the longitudinal vertical plane of symmetry, to the right and to the left, and as near as possible to the point of contact with the shell of a vertical plane perpendicular to the longitudinal plane of symmetry, to the front and to the rear.

6.16.3. Colorimetric test

Each of the retroreflective areas shall emit white light when it is illuminated with a standard illuminant A, with an observation angle of 1/3° and an illumination angle $\beta_1 = \beta_2 = 0°$ (or $\beta_1 = \pm 5°$, $\beta_2 = 0°$); in other words: the trichromatic coordinates "x" and "y" of the reflected light shall lie within the zone specified below:

White:

limit towards blue	$x \geq 0.310$
limit towards yellow	$x \leq 0.500$
limit towards green	$y \leq 0.150 + 0.640x$
limit towards green	$y \leq 0.440$
limit towards purple	$y \geq 0.050 + 0.750x$
limit towards red	$y \geq 0.382$

6.16.4. Photometric test

The minimum value of the luminous intensity coefficient of a surface area of 18 cm^2 of material when revolved shall not be less than the values specified in the table below, expressed in millicandelas per lux.

Angle of Divergence	Angle of Illumination		
	0°	20°	40°
20'	100	60	25

6.16.5. Resistance to external agent

After each conditioning as described in paragraph 7.2., the helmet shall be visually inspected. There shall be no signs of cracking or appreciable distortion of the retroreflective material.

6.16.6. Compatibility of materials

Neither the adhesive nor the retroreflective material shall affect the mechanical performance of the helmet according to the related tests in the present Regulation."

Paragraph 7.1., amend to read:

"7.1. Each helmet type shall be conditioned as shown below.

Test	Number of helmets to be conditioned				Total
	solvent plus ambient-temperature and hygrometry conditioning	solvent plus heat conditioning	solvent plus low-temperature conditioning	solvent plus ultra-violet radiation conditioning and moisture conditioning	
Impact absorption	2	1	1	1	5
Rigidity	2				2
Retention system	1				1
					8

The largest helmet size of each helmet type shall be tested for impact absorption and rigidity. For retention systems' tests, helmet sizes shall be chosen in accordance with paragraph 6.11.8.

Additionally, for each smaller headform size within the size range of the helmet type two helmets shall undergo the impact absorption test. One helmet shall be heat conditioned, and the other low temperature conditioned. The conditioned helmets shall be impacted against either anvil, in equal numbers if possible, at the choice of the laboratory."

Paragraph 7.2., amend to read:

"7.2. Types of conditioning

Prior to any type of further conditioning for mechanical tests, as specified in paragraph 7.1., each helmet shall be subject to solvent conditioning."

Insert a new paragraph 7.2.1., to read:

"7.2.1. Solvent conditioning

Take a cotton cloth approximately 150 mm square and a quantity approximately 25 ml of a solvent consisting of test liquid B in accordance with ISO 1817:1985*/. Using the cloth soaked in the solvent, apply the solvent to all those regions of the outside surface of the helmet within 50 mm of the chin strap fixings, and keep these regions wet with the solvent for (7.5 ± 2.5) s. Repeat the procedure on the remainder of the external surface including any chin guard, keeping these regions wet for (12.5 ± 2.5) s. Do not carry out any further conditioning or testing during the following 30 min.

*/ e.g. 70 per cent octane and 30 per cent toluene"

Paragraphs 7.2.1. to 7.2.4.2. (former), renumber as paragraphs 7.2.2. to 7.2.5.2.

Paragraph 7.3.1.3.1., amend to read:

".... The helmet is then tipped towards the rear so that the front edge of the helmet in the median plane is displaced by 25 mm; the retention system is then adjusted under the chin of the headform; if the system includes an adjustable chin strap, the strap is tightened as for normal use."

Paragraph 7.3.1.4., amend to read:

"7.3.1.4. Test

The test shall be performed not more than five minutes after the helmet is taken from the conditioning chamber. The drop height shall be .... equal to:

7.5 (+0.15, -0) m/s for both anvils specified in paragraphs 7.3.2.3.1. and 7.3.2.3.2."

Paragraph 7.3.1.5., amend to read:

".... The acceleration against time at the centre of gravity of the headform is measured and recorded and the Head Injury Criterion (HIC) calculated as prescribed in paragraph 7.3.2.5."

Paragraph 7.3.2.3.2., amend to read:

"7.3.2.3.2. The kerbstone anvil shall have two sides forming an angle of (105 ± 5)°, each of them with a slope of (52.5 ± 2.5)° towards the vertical and meeting along a striking edge with a radius of 15 mm ± 0.5 mm. The height must be at least 50 mm and the length not less than 125 mm. The orientation is 45° to the longitudinal vertical plane at points B, P, and R, and 45° to the base plane at point X (front low, back up)."

Paragraph 7.3.2.5., add the following text at the end:

"....
The HIC shall be calculated as the maximum (depending from t1 and t2) of the equation:

$$HIC = \left[\frac{1}{t_2 - t_1} \int_{t_2}^{t_1} a(t)\, dt \right]^{2.5} (t_2 - t_1)$$

where 'a' is the resultant acceleration as a multiple of 'g' and t1 and t2 are any two points in time (sec) during the impact. The acceleration data has to be sampled at a frequency of at least 8 000 Hz and filtered in accordance with the latest edition of ISO 6487 (CFC 1000)."

Paragraphs 7.3.4.1. and 7.3.4.2., amend to read:

"7.3.4.1. Each test shall be carried out with 4 impacts on one helmet on the points B, X, P and R, in this sequence.

7.3.4.1.1. After each impact the helmet shall be re-positioned correctly on the headform prior to the next impact, without interfering with the adjustment of the retention system.

7.3.4.1.2. A fifth impact shall be carried out at a velocity of 4 m/s or 8.5 m/s (in equal number) on point X on the undamaged side of the helmet, using the same anvil as the other sites. The data from this impact shall be recorded by the laboratory for information only and is not subject to a separate requirement.

7.3.4.2. Four points of impact are defined for each helmet:

B, in the frontal area, situated in the vertical longitudinal plane of symmetry of the helmet and at an angle of 20° measured from Z above the AA' plane.

X, in either the left or right lateral area, situated in the central transverse vertical plane and 12.7 mm below the AA' plane.

R, in the rear area, situated in the vertical longitudinal plane of symmetry of the helmet and at an angle of 20° measured from Z above the AA' plane.

P, in the crown area, situated above the AA' plane and above the transverse plane passing through B and Z, and not within 50 mm of the other points.

Impacts at B, X and R should be within 10 mm radius of the defined point."

Paragraph 7.3.4.3. should be deleted.

Paragraph 7.3.5., amend to read:

"7.3.5. Combination of conditioning and anvils

Conditioning: Solvent plus	Anvils
Ambient	Flat and kerbstone
Heat	Kerbstone*/
Low temperature	Flat*/
Ultraviolet radiation and moisture	Flat or kerbstone (to be selected by the laboratory)

*/ Only for the largest helmet size. For smaller headforms in the size range of the helmet type either anvil may be used. See paragraph 7.1."

Insert a new paragraph 7.3.6., to read:

"7.3.6. The absorption efficiency shall be considered sufficient where the resultant acceleration measured at the centre of gravity of the headform at no time exceeds 275 g, and the Head Injury Criterion does not exceed 2400.

The helmet shall not become detached from the headform."

Paragraphs 7.4. to 7.4.4., the text should be deleted, leaving a note to read:

"7.4. (not used)"

Paragraph 7.6.6., amend to read:

"7.6.6. Damage to the retention system shall be accepted provided that it is still possible to remove the helmet easily from the headform. In the case of retention systems fitted with quick release mechanisms it must be possible to release the mechanism in accordance with paragraphs 7.11.2. to 7.11.2.2. The specifications set out in paragraphs 7.6.4. and 7.6.5. shall be met."

Insert new paragraphs 7.9. to 7.11.3.5., to read:

"7.9. Micro-slip test of the chin strap (see annex 8, Figure 4)

7.9.1. The test rig consists of a flat horizontal robust base, a weight for applying a load, a freely rotatable horizontal roller of diameter not less than 20 mm, and in the same horizontal plane as the top of the roller a clamp capable of reciprocating horizontal motion at right angles to the axis of the roller with a total amplitude of 50 ± 5 mm at a frequency between 0.5 Hz and 2 Hz.

7.9.2. Take a sample of the strap at least 300 mm long, including the tensioning and adjusting device and any additional strap fastening. Fix the upper end of the strap to the reciprocating clamp level with the top of the roller and drape the strap over the roller. Attach a weight to the lower end of the strap so that when the weight is lifted by the strap it imposes a tensile force of 20 ± 1 N. Adjust the apparatus so that when the reciprocating clamp is at the centre of its motion the weight is just resting on the base with the strap barely in tension and the strap buckle is between the clamp and roller and will not touch the roller during reciprocation.

7.9.3. Operate the reciprocating clamp for 20 cycles. Note the position of the components on the strap. Operate the reciprocating clamp for 500 cycles then record the distance through which the components have slipped along the strap.

7.9.4. The total slippage through the grip shall not exceed 10 mm.

7.10. Test for resistance to abrasion of the chin strap (see annex 8, Figure 5)

The test shall be performed on every device in which the strap slides through a rigid part of the retention system, with the following exceptions:
(a) where the micro-slip test, paragraph 7.9., shows that the strap slips less than half the prescribed value; or,
(b) where the composition of the material used, or the information already available, renders the test superfluous in the judgement of the technical service.

7.10.1. The test rig is similar to that described in paragraph 7.9.1. except that the amplitude of motion is 100 ± 10 mm and the strap passes over a representative surface of the associated adjuster or other strap fitting through an appropriate angle.

7.10.2. Select an arrangement of the apparatus appropriate for the particular design of both the strap and the fitting likely to cause abrasion. Grip one end of the strap in the oscillating clamp, arrange the strap to be threaded through the fitting as designed and hang a weight on the end to tension the strap with a force of 20 ± 1 N. Mount or otherwise steady the fitting in such a

position that movement of the oscillating clamp slides the strap through the fitting, in a manner simulating slippage of the fitting on the strap when the helmet is on the head.

7.10.3. Oscillate the clamp for a total of 5000 cycles at a frequency between 0.5 and 2 Hz.

7.10.4. Mount the abraded strap in a tensile testing machine using clamps which avoid local breakage of the strap, and so that there is a length of 150 ± 15 mm of strap, including the abraded portion, between the clamps. Operate the machine to stretch the strap at a speed of 100 ± 20 mm per minute.

7.10.5. The strap shall withstand a tension of 3 kN without breaking.

7.11. Tests for retention systems relying on quick-release mechanisms

7.11.1. Inadvertent release by pressure

7.11.1.1. If the retention system is designed to be released by pressure on a certain part, the system shall not release when a rigid sphere of diameter 100 mm is pressed with a force of 100 ± 5 N directly in the line of movement of that part.

7.11.1.2. If such a system incorporates more than one quick-release mechanism, or one such mechanism requiring more than one operation to release it, the system shall be deemed not to comply with this requirement if sufficient opening of the system is caused by the pressure of the sphere on only one quick-release mechanism or for only one operation, whichever is appropriate, to allow the release of the appropriate headform.

7.11.2. Ease of release

7.11.2.1. The helmet shall be mounted on the apparatus described in paragraph 7.6. such that a static force of 150 ± 5 N is applied to the retention system. An additional static force of 350 ± 5 N shall be applied to the retention system for at least 30 seconds and then removed. After the additional force has been removed, the opening system shall be capable of being operated by a force not exceeding 30 N. However, if the quick release mechanism is incorporated in the helmet shell, the opening system shall be capable of being operated by a force not exceeding 60 N.

7.11.2.2. The buckle opening force shall be applied using a dynamometer or similar device in the manner and direction of normal use. In the case of a push button the contact end shall be a polished metal hemisphere with radius 2.5 ± 0.1 mm. The opening force shall be applied on the geometric centre of the push button or respective application areas.

7.11.3. Durability of quick-release mechanisms

7.11.3.1. Subject the quick-release mechanism to the following procedures in the order given.

7.11.3.2. Using apparatus appropriate to the particular design of mechanism carry out the following procedure. Close and lock the mechanism. Apply a loading force of 20 ± 1 N in the direction in which the mechanism is designed to bear load, then unlock and disengage the mechanism under load. Complete this cycle in not less than 2 s. Repeat for a total of 5000 cycles.

7.11.3.3. If the quick-release mechanism incorporates metal components carry out the following procedure.

7.11.3.4. Place the complete mechanism in a closed cabinet so that the mechanism can be continuously wetted by a spray while still allowing free access of air to all parts of the mechanism. Subject the mechanism to a spray of a solution consisting of 5 ± 1 per cent (m/m) of reagent grade sodium chloride in distilled or deionized water for a period of 48 ± 1 h at a temperature of 35 ± 5 °C. Rinse the mechanism thoroughly in clean running water to remove salt deposits and allow it to dry for 24 ± 1 h.

Repeat the procedure in paragraph 7.11.3.2.

7.11.3.5. The quick release mechanism shall not fracture nor disengage when a tensile force of 2.0 kN ± 50 N is progressively applied to the retention system in the direction in which the mechanism is designed to bear load. Following the application and removal of the force, the quick release mechanism shall still be capable of operation."

Paragraph 8.1., amend to read:

"... In the case of the impact absorption test the report shall indicate, in addition to the results of the tests, the type of conditioning and the anvil used when these are at the discretion of the technical service, and the results of the impact on the fifth site."

Paragraph 9.2., add a sentence at the end, to read:

"... The technical service can, at any time, request all necessary data concerning the conformity of production of the retroreflective material."

Insert new paragraphs 15 to 15.2.1.2., to read:

"15. TRANSITIONAL PROVISIONS

15.1. Helmets

15.1.1. As from the official date of entry into force of the 04 series of amendments, no Contracting Party applying this Regulation shall refuse to grant ECE approval under this Regulation as amended by the 04 series of amendments.

15.1.2. As from 18 months after the official date of entry into force of the 04 series of amendments, no Contracting Party applying this Regulation shall grant ECE approvals unless the helmet type to be approved meets the requirements of this Regulation as amended by the 04 series of amendments.

15.1.3. As from 30 months after the official date of entry into force of the 04 series of amendments, all the Contracting Parties applying this Regulation shall prohibit the application of conformity labels mentioned in paragraph 5.1.4. if they refer to type approvals granted under the preceding series of amendments to this Regulation.

15.1.4. As from 36 months after the official date of entry into force of the 04 series of amendments, Contracting Parties applying this Regulation may prohibit the sale of helmets which do not meet the requirements of the 04 series of amendments to this Regulation.

15.2. VISORS

15.2.1. Since the type approval of visors is not affected by the present series of amendments:

15.2.1.1. As from the official date of entry into force of the 04 series of amendments, new types of visors approved under the provisions of this Regulation may be marked according to the 04 series of amendments.

15.2.1.2. ECE approvals granted for visors under the preceding series of amendments to this Regulation shall remain valid."

Insert new paragraphs 15.3. and 15.3.1., to read:

"15.3. CONFORMITY OF PRODUCTION AND ROUTINE TESTS

15.3.1. No Contracting Party applying this Regulation shall apply the criterion

$$\bar{X} + 2.4\ S \text{ shall not exceed } L$$

as contained in paragraph 9.3.4., to the HIC value as measured in accordance with paragraph 7.3."

Annex 4, Figure 3, amend as follows, to show point R (as defined in new paragraph 7.3.4.2.):

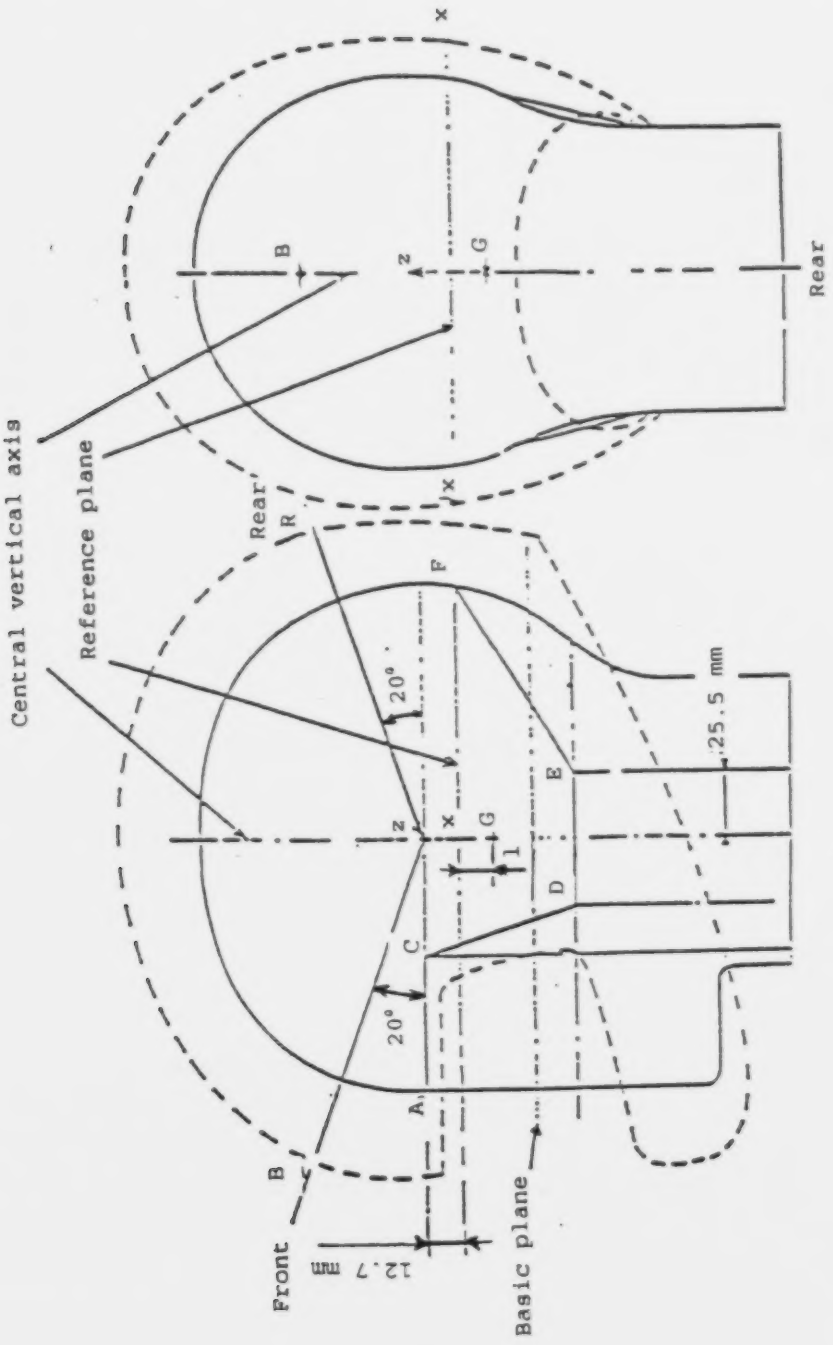


Figure 3: Identification of points of impact

Annex 8, insert new Figures 4 and 5, to read as follows:

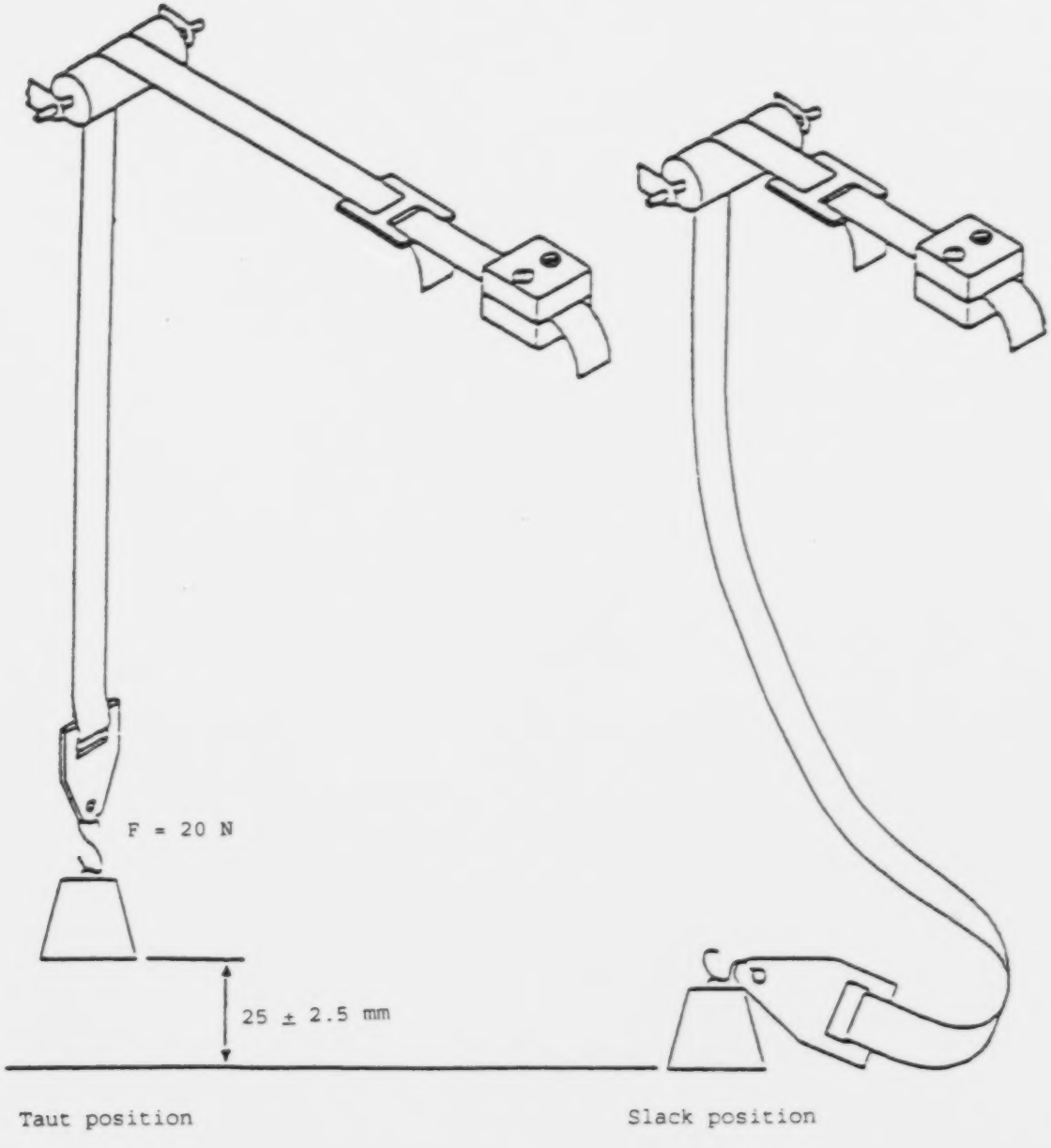


Figure 4: Apparatus for testing slippage of the chin strap

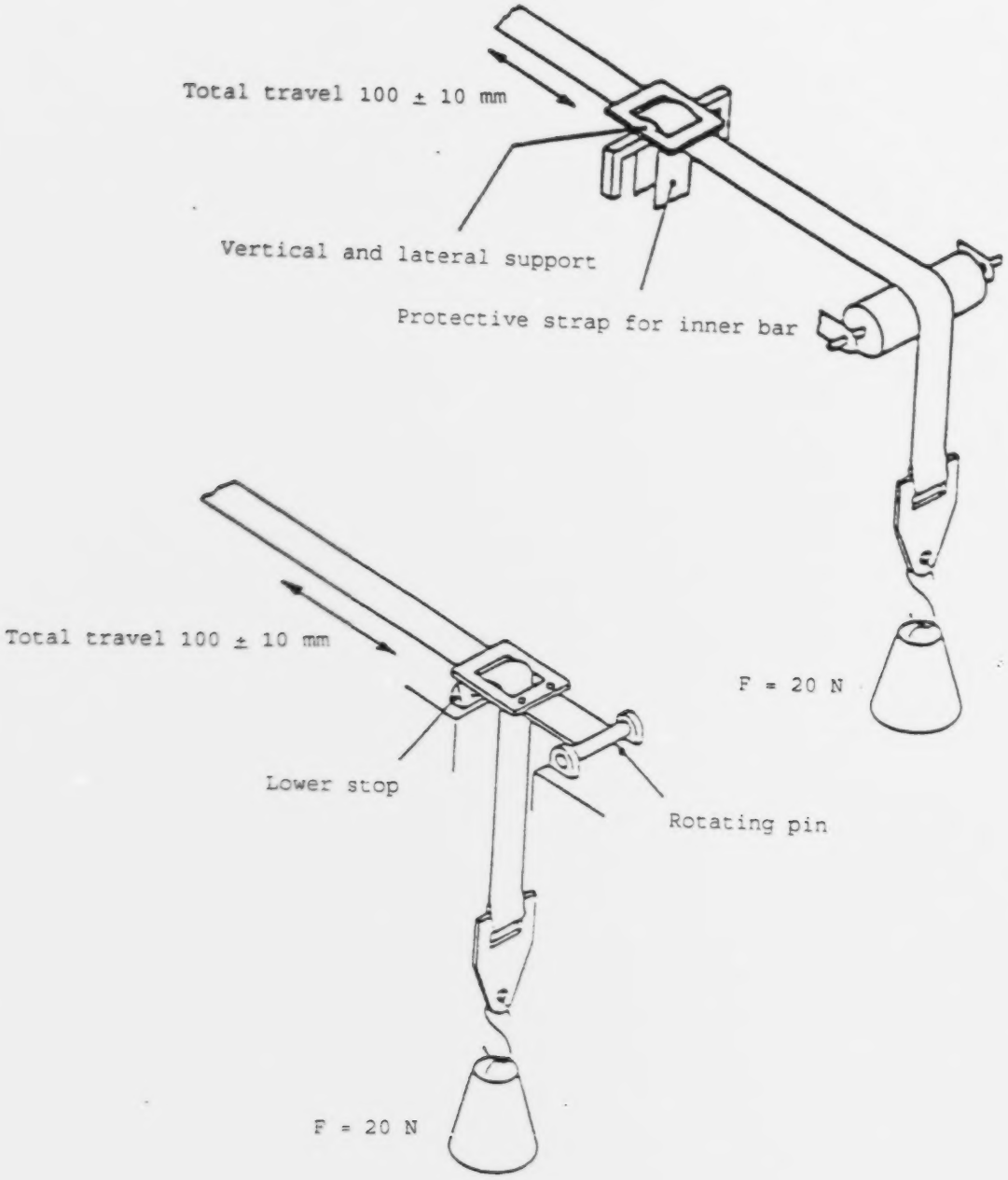

Total travel 100 ± 10 mm
Vertical and lateral support
Protective strap for inner bar
F = 20 N
Total travel 100 ± 10 mm
Lower stop
Rotating pin
F = 20 N

Figure 5: Apparatus for testing abrasion of the chin strap